I. AMENDMENTS TO THE CLAIMS

Claims 1–54 are pending in this application. As of this Response, Applicant has amended Claim 15. Claims 1–14 and 16–54 remain as originally filed or previously presented.

1. (Original) An input system for use with a simulated environment, comprising:

an immobilizing device which restricts the motion of a portion of a user's body;

sensors which detect forces applied by the restricted portion of the user's body;

a sensory feedback device which provides a sensation to the user corresponding to the motion which occurs in the simulated environment.

2. (Original) An input system as in Claim 1 wherein the forces detected by the sensors are sent to the processing unit to determine the motion of the user in the simulated environment to which the sensations provided by the sensory feedback device will correspond.

3. (Original) An input system as in Claim 1 wherein the sensors comprise strain gauges which are disposed upon the immobilizing device.

4. (Original) An input system as in Claim 1 wherein the sensory feedback device comprises at least one vibrating element which is disposed substantially adjacent to a nerve spindle of a muscle of the restricted portion of the user's body.

5. (Original) An input device as in Claim 1 wherein the sensory feedback device is used to provide a sensation of movement to the user when no actual movement of the type corresponding to the sensation occurs.

6. (Original) A method for providing feedback to a user of a processing unit, comprising the steps of:

providing an immobilizing device which holds a portion of the user's body immobile;

providing vibrating devices disposed upon the immobilizing device and positioned to touch the immobilized portion of the user's body near muscles which would extend if the immobilized portion of the user's body moved;

sending signals from the processing unit to the vibrating devices to cause the vibrating devices to vibrate;

controlling these signals such that the vibrating devices located near a particular muscle vibrate to provide feedback indicating that the immobilized portion of the user's body is moving.

7. (Original) A method as in Claim 6 wherein the signals sent to the vibrating devices by the processing unit are controlled based upon the forces exerted by the immobilized portion of the user's body against the immobilizing device.

8. (Original) A method as in Claim 7 wherein the forces exerted against the immobilizing device are measured using strain gauges disposed upon the immobilizing device.

9. (Original) A method as in Claim 7 wherein the signals are sent to the vibrating devices such that the feedback provided indicates to the user that the immobilized portion of the user's body is moving in the way it would have moved were it not immobilized.

10. (Original) An input system for a user comprising an immobilizing device which restricts the motion of a portion of the user's body, a vibrating device disposed substantially adjacent to a nerve spindle of a muscle of the user's body which extends when the restricted portion of the user's body moves, and a processing unit which sends signals to the vibrating devices to control the operation of the vibrating devices, the processing unit controlling the signals such that the vibrating devices located adjacent to a particular muscle provide feedback indicating that the restricted portion of the user's body is moving.

11. (Original) An input system as in Claim 10 wherein the vibrating device comprises a signal generator adapted for connection to a body at a location such that it will effect the signal sent by the nerve spindle to the brain.

12. (Original) An input system as Claim 10 wherein the signals sent to the vibrating devices by the processing unit are controlled based upon the forces exerted by the immobilized portion of the user's body against the immobilizing device.

13. (Original) An input system as in Claim 12 wherein the forces exerted against the immobilizing device are measured using strain gauges disposed upon the immobilizing device.

14. (Original) An input system as in Claim 10 wherein the signals are sent to the vibrating devices such that the feedback provided indicates to the user that the immobilized portion of the user's body is moving in the way it would have moved were it not immobilized.

15. (Currently Amended) A method for providing an indication to a user that his body has moved when it has not, comprising:

preventing an intended motion of a portion of a user's body, wherein the portion of the user's body is substantially immobilized;

detecting the intended motion of [[a]] the portion of the user's body~~, wherein the portion of the user's body is substantially immobilized~~; and

providing sensory feedback which is a reflection of the intended motion.

16. (Original) A method as in Claim 15 further comprising the step of immobilizing the portion of the user's body.

17. (Original) A method as in Claim 15 wherein the sensory feedback comprises a vibration produced by a vibrating element placed against the user's body.

18. (Original) A method as in Claim 17 wherein the sensory feedback provided suspends the feedback provided naturally by the user's body which reflects the actual motion of the portion of the user's body.

19. (Original) A method as in Claim 16 wherein the step of immobilizing a portion of the user's body further comprises attaching the portion of the user's body to a rigid structure so as to restrict the motion of the portion of the user's body.

20. (Original) A method as in Claim 19 wherein the step of detecting the intended motion comprises measuring the force applied against the rigid structure by the immobilized portion of the user's body.

21. (Original) A method as in Claim 20 wherein the force applied against the rigid structure is measured by using strain gauges to detect the deflection of the structure due to the force applied against it.

22. (Original) A method as in Claim 15 wherein the step of detecting the intended motion comprises measuring the direction and magnitude of the forces applied by the immobilized portion of the user's body.

23. (Original) An input system for use with a simulator, comprising an immobilizing device, a processing unit, and an output system, the immobilizing device holding the head of a user in a substantially fixed position with respect to the user's torso and further comprising sensors to detect a force exerted by the user in attempting to move the user's head, and the processing unit calculating the effect of the force applied by the user in a simulated environment and presenting this effect in the simulated environment to the user via the output system.

24. (Original) An input system as in Claim 23 wherein the output system corresponds to a remotely operated physical device which is operated according to the input system and which is controlled through the processing unit and represented in the simulated environment.

25. (Original) An input system as in Claim 23 further comprising vibration devices, the vibration devices touching the user within the immobilizing device and being controlled by the processing unit to provide sensations for the user which mimic the sensations which would be felt during motion of the immobilized portion of the user's body as it moves in the simulated environment.

26. (Original) An input system as in Claim 23 wherein the processing unit is programmed to use a physical model for the simulated environment which provides passive feedback by immobilizing the user such that the user applies force against the immobilizing device in a manner which reflects the forces which would be applied to the user in the simulated environment.

27. (Original) An input system as in Claim 23 wherein the immobilizing input device comprises a securement device within which the user places his head and which is rigidly attached to a seat upon which the user sits during use of the input system.

28. (Original) An input system as in Claim 27 wherein the securement device comprises a helmet.

29. (Original) An input system as in Claim 27 wherein the securement device comprises a stiff headband.

30. (Original) An input system as in Claim 27 wherein the securement device comprises a pair of substantially semi-circular braces, one of which is placed upon the rear of the user's head and the other of which is fit snugly to the front of the user's head above the eyes and about the temples.

31. (Original) An input system as in Claim 27 wherein the securement device is attached to the seat of the system using at least one support member.

32. (Original) An input system as in Claim 31 wherein the sensors are disposed upon the support member.

33. (Original) An input system as in Claim 23 wherein the sensors comprise strain gauges.

34. (Original) An input system as in Claim 33 wherein the sensors are disposed in two sets of opposing pairs on each support member.

35. (Original) An input system as in Claim 23 further comprising at least one additional immobilizing device which holds an arm of the user from the elbow to the hand in a substantially fixed position with respect to the torso of the user and which further comprises sensors disposed so as to measure the forces exerted by the arm of the user at least at a point near the elbow of the user and at a point near the wrist of the user.

36. (Original) An input system as in Claim 35 wherein the additional immobilizing device detects the forces exerted by the user in attempting to move his arm and sends this information to the processing unit.

37. (Original) An input system as in Claim 23 further comprising at least one additional immobilizing device which holds a leg of the user from the knee to the foot in a substantially fixed position with respect to his torso and which further comprises pressure sensors disposed so as to measure the forces exerted by the leg of the user at least at a point near the knee of the user and at a point near the ankle of the user.

38. (Original) An input system as in Claim 37 wherein the additional immobilizing device detects the forces exerted by the user in attempting to move his leg and sends this information to the processing unit.

39. (Original) An input system as in Claim 23 wherein the visual display of the output system fills substantially all of the visual field of view of the user when the user's head is immobilized within the input system.

40. (Original) An input system as in Claim 39 wherein the visual display comprises a screen which is positioned between the user's head and a projection system located on the opposite side of the screen as the user's head.

41. (Original) An input system as in Claim 23 wherein additional input signals are sent to the processing unit by an additional input device disposed upon the immobilizing device.

42. (Original) An input system as in Claim 41 wherein the additional input device comprises a gun handle and trigger.

43. (Previously Presented) An input system as in Claim 41 wherein the additional input device comprises at least one button.

44. (Original) An input system as in Claim 41 wherein the additional input device comprises a joystick.

45. (Original) An input system for use with a computer, comprising at least one immobilizing device which holds a portion of the body of a user of the system in a substantially fixed position, the immobilizing device comprising sensors and vibration devices, the sensors being configured to detect forces exerted by the user in attempting to move the portion of the body held by the immobilizing device, the sensors sending signals representing the magnitude and direction of these forces to the computer, and the vibration devices disposed upon the muscles of the user and controlled by the computer so as to provide sensations which mimic the sensations which would be felt if the attempted motion had occurred.

46. (Original) An input system as in Claim 45 further comprising a movable frame which is connected to the computer and actuators which are capable of moving the frame, wherein the user and the immobilizing device are located within the frame, and the actuators are controlled by the computer so as to coordinate the motion of the frame to provide motion feedback to the user of the system.

47. (Original) An input system as in Claim 45 wherein the head of the user is immobilized with respect to the torso of the user by the immobilizing device and further comprising a visual display disposed in fixed relation to the user's head, the display connected to the computer and configured to provide visual feedback to the user of the system.

48. (Original) An input system as in Claim 47 wherein the visual feedback provided encourages the user to apply forces to the immobilizing device in order to control the visual display.

49. (Original) An input system as in Claim 45 wherein the input system is used to control a physical device which is connected to the computer.

50. (Original) An input system as in Claim 49 wherein the physical device comprises a remotely operated machine.

51. (Original) An input system as in Claim 49 wherein the computer controls the vibration devices to provide feedback to the user which is based upon the motion of the physical device.

52. (Original) A method for a user to control an environment simulated on a computer system where the user is modeled within the simulated environment, comprising:

providing at least one immobilizing device which restricts the 1motion of at least a portion of the user's body;

detecting the forces exerted by the immobilized portion of the user's body against the immobilizing device;

sending a signal representing these forces to the computer system; and

determining the effect that these forces have upon the model of the user in the environment simulated by the computer.

53. (Original) A method as in Claim 52 wherein forces exerted by the immobilized portion of the user's body are detected by measuring the deflection of the immobilizing device.

54. (Original) A method as in Claim 53 wherein the deflection of the immobilizing device is measured using strain gauges disposed upon the immobilizing device.